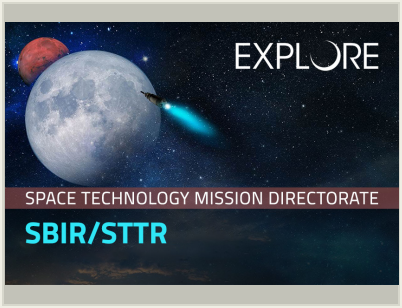
OpenCL-Based Linear Algebra Libraries for High-Performance Computing, Phase I

Completed Technology Project (2012 - 2012)

Project Introduction

Despite its promise, OpenCL adoption is slow, owing to a lack of libraries and tools. Vendors have shown few signs of plans to provide OpenCL libraries, and were they to do so they would likely be incompatible with one another, much as NVIDIA's BLAS (CUDA) is presently not interchangeable with Intel's BLAS (MKL). The unified language and environment of OpenCL allows the community to ensure that the spirit of the language — its interchangeability — is reflected in its library and tools ecosystem. EM Photonics is well positioned to lead this effort; we have strong ties to several hardware manufacturers, to application developers, and we maintain a world-class LAPACK library for NVIDIA GPUs. To begin this process, EM Photonics proposes the development of a set of OpenCL BLAS routines and the framework necessary to allow researchers, developers, and hardware manufactures to integrate platform optimized versions of BLAS libraries. This software will be made open source to encourage community involvement and allow it to continue to evolve with the with future hardware technology. Upon completion of this project, EM Photonics will have developed a complete set of OpenCL BLAS routines. In addition, we will have the framework necessary for their efficient execution that also allows new routines to be added by either EM Photonics or third parties. This package will be released under an open source license to encourage community participation and allow for widespread adoption, and EM Photonics will be its ongoing steward. The commercial success of our CULA product has both opened doors for partnership opportunities and provided us commercialization opportunities that can be further leveraged once this project is complete. Based on this combination of technology, experience, partnerships, and commercial momentum, we are convinced this project will successfully meet our SBIR objectives and continue to flourish beyond.



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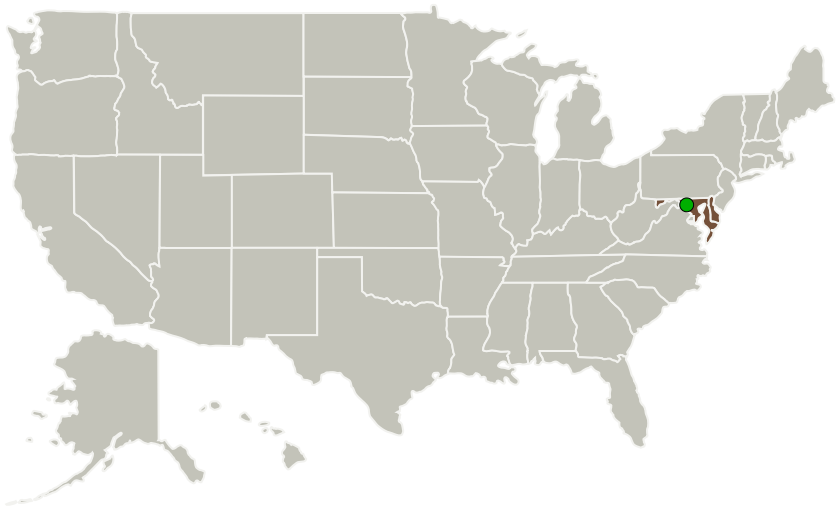
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
EM Photonics, Inc.	Lead Organization	Industry	Newark, Delaware
Goddard Space Flight Center(GSFC)	Supporting Organization	NASA Center	Greenbelt, Maryland

Primary U.S. Work Locations	
Delaware	Maryland

Project Transitions

February 2012: Project Start

August 2012: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/138390)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

EM Photonics, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

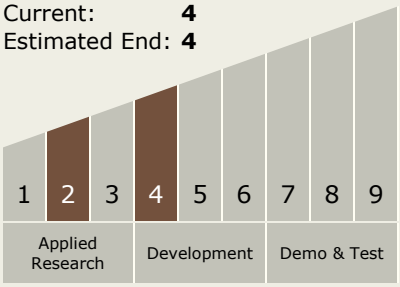
Carlos Torrez

Principal Investigator:

Kyle Spagnoli

Technology Maturity (TRL)

Start: **2**
Current: **4**
Estimated End: **4**



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Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
  - TX06.4 Environmental Monitoring, Safety, and Emergency Response
    - TX06.4.1 Sensors: Air, Water, Microbial, and Acoustic

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System